

Name \_\_\_\_\_ Date \_\_\_\_\_

## DID PETE CHEAT?

### A Lab on Chromatography of Inks

#### Objective

You will use chromatography to determine whether a document in question was written with one or two ink pens.

#### Background Information

Pete Greer owns a computer business and he has become quite successful in the last several years. To save money, Pete refuses to hire an accountant to help him file his income taxes. When preparing his taxes, however, Pete can rarely find the receipts that verify the deductions he claimed as business expenses.

About a month ago, Pete received a card from the IRS notifying him that his income taxes for the last four years were going to be audited. Pete was instructed to gather all his supporting documentation and bring it with him to the IRS auditor's office.

Pete panicked and began collecting everything he could find. He found some of the receipts from the purchase of computer equipment for the new business. However, he could not find them all. Pete was not sure that he had all of the documents he needed to back up the numbers he filed on his taxes. He considered changing the amounts on several of the receipts. He thought, "I'll use this black felt-tip pen and change some of those 3's to 8's. No one will ever know the difference. In fact, they may end up owing me some money!"

Did Pete change any of the numbers on the receipts that verify his business expenses? You are the forensic scientist who must answer this question.

#### Materials

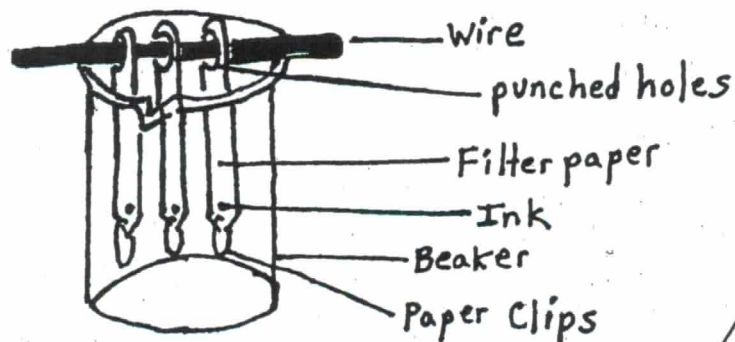
- Large beaker
- Straight piece of coat hanger or stiff wire
- Hole puncher
- Water
- 3 paper clips
- Ruler
- Pencil
- 3 pieces of filter paper with ink samples from the questioned document
- Paper towels

#### Procedure

1. Obtain three pieces of filter paper with ink samples on them. These three papers were taken from three separate locations on one of Pete's suspicious receipts.

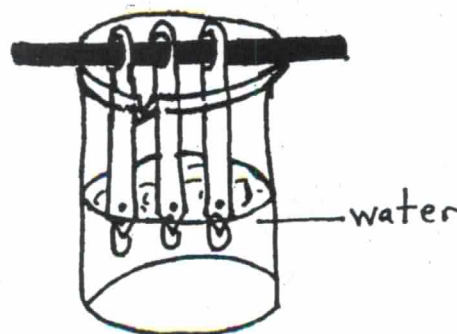
## Lab 1-3A (cont'd)

2. Use a hole puncher to make a hole in each piece of paper at the end *opposite* the ink mark.
3. Thread a piece of stiff wire through the holes in the three pieces of paper. Make sure the pieces of paper do not touch each other when they hang from the wire.
4. Place a paper clip at the pointed end of each piece of paper. This will keep the pieces of paper from curling.
5. Lower the three pieces of paper into a beaker. Rest the stiff wire across the top of the beaker so the three samples are hanging into the beaker but not touching the bottom of the beaker.



*Procedure  
will  
be  
modified.*

6. Carefully add water to the beaker until it covers the paper clips and makes contact with the pointed ends of the papers. Do not add so much water that it covers the ink marks on the papers.



7. Leave this beaker undisturbed until the solvent has dampened most of each piece of paper.
8. Remove the wire and the three pieces of paper. Place the three pieces of paper on a paper towel to dry.
9. Once dry, <sup>tape</sup> ~~staple~~ the three pieces of paper (which are chromatograms) to your Postlab Questions.

**Postlab Questions for Lab 1-3A (continued)**

2. Did Pete change his receipts to keep from paying more money to the IRS? Support your answer.

---

---

---

---

---

---

---

---

3. Is water always a good solvent in ink separation? Explain your answer.

---

---

---

---

---

---

---

---

4. How could a teacher use ink chromatography to determine whether or not a student has changed his or her answers after a test has been graded and returned?

---

---

---

---

---

---

---

---

**Lab 1-3B**  
(cont'd)

**DATA TABLE**

Distances (in centimeters) that ~~acetone~~ <sup>H<sub>2</sub>O</sup> and ~~lipstick~~ <sup>Ink</sup> components moved up the paper.

INK Lipstick samples	Distance <del>acetone</del> <sup>H<sub>2</sub>O</sup> moved	Distance <del>lipstick</del> <sup>Ink</sup> components moved	R <sub>f</sub>
A	i.	ii.	
		iii.	
		iv.	
		v.	
B	i.	ii.	
		iii.	
		iv.	
		v.	
C	i.	ii.	
		iii.	
		iv.	
		v.	
D	i.	ii.	
		iii.	
		iv.	
		v.	